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I. PURPOSE OF CHEMICAL HYGIENE PLAN (CHP)

Angelina College is committed to providing a safe working environment and believes employees have a right to know of any health hazards so they can make knowledgeable decisions about any personal risks of employment. This Chemical Hygiene Plan includes policies and responsibilities designed to give each employee an awareness of potentially hazardous chemicals in the workplace and to train them in appropriate, safe working conditions.

The Chemical Hygiene Plan applies to all persons, including college employees, students, and visitors authorized to be present at this particular location (laboratory and prep areas). All persons subject to the CHP shall be informed of its location and availability as well as the Safety Data Sheets (SDS) and other pertinent reference materials relating to their health and safety while in the particular work area.

All employees will have access to pertinent safety information through their supervisory staff. The people who work in any instructional laboratory are best able to detect potential hazards in either the facility or in work procedures. When safety concerns arise, employees are encouraged to contact their Dean/Associate Dean/Director.

A training program is designed for the benefit and protection of all laboratory users. Necessary information will be available to inform the users on how best to handle hazardous chemicals and how to make use of the Chemical Hygiene Plan. This plan shall be reviewed and evaluated for its effectiveness annually by the Environmental Health & Safety (EH&S) Team.

II. STANDARD OPERATING PROCEDURES

Because few laboratory chemicals are without hazards, general precautions for handling all laboratory chemicals have been adopted to include minimizing exposure and assuming that any mixture of hazardous chemicals is more toxic than the most toxic component.

The following procedures are used when working with chemicals:

A. Accidents and spills

1. Eye contact: promptly flush eyes with water for prolonged period (15 minutes) and seek medical attention.
2. Ingestion: Each chemical affects the body differently.
 - ❖ Consult SDS and/or contact the Texas Poison Center (800-222-1222).
3. Skin contact: promptly flush the affected area when contact is extensive. If symptoms persist after washing, seek medical attention.
4. Clean-up: promptly clean up spills according to the Angelina College Spill Cleanup Procedure (No. 13.3). Clean-up should, in most cases, be performed by the lab instructor or technician.
 - ❖ In any case where there is question as how to safely clean-up spills, contact the EH&S Manager (ext. 3244).
 - ❖ In any case where there are severe health hazards due to the spill, contact the Senior Director of Physical Plant (ext. 5280).
5. Medical attention should be obtained for body contact of hazardous chemicals.

B. AVOID UNNECESSARY EXPOSURE TO CHEMICALS.

1. Do not smell or taste chemicals. Apparatus that can discharge toxic chemicals (vacuum pumps, distillation columns, etc.) should be vented into local exhaust devices.
2. Insure no holes exist in the gloves before use.
3. Use only those chemicals for which the quality of the available ventilation system is appropriate.
4. Never eat, drink, smoke, chew gum, or apply cosmetics or lip balm in areas where laboratory chemicals are present. Wash hands before conducting these activities outside the lab.
5. Storing, handling, or consuming food or beverages in chemical laboratory storage areas, refrigerators, glassware, or utensils that are also used for laboratory operation is prohibited.
6. Wash areas of exposed skin thoroughly before leaving the laboratory.
7. Horseplay, disorderly conduct, or use of abusive language in the laboratory is prohibited.
8. Always use a pipet bulb when pipetting; do not use mouth suction.
9. Confine long hair and loose clothing.
10. Wear shoes at all times in the laboratory.
11. Keep the work area clean and uncluttered, with chemicals and equipment properly labeled and stored; clean up the work area on completion of an operation or at the end of each day.
12. Ensure that appropriate eye protection, where necessary, is worn by all persons, including visitors, in areas where chemicals are stored or handled.
13. Wear appropriate gloves when the potential for contact with toxic materials exists; inspect the gloves before each use, and replace them periodically.
14. Use any other protective emergency apparel and equipment as appropriate.
15. Remove laboratory coats immediately upon contamination.
16. Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation..
17. Use a hood for operations that might result in release of toxic chemical vapors or dust.
 - As a rule of thumb, use a hood or other local ventilation device when working with any appreciably volatile substance with a threshold limit value (TLV) of less than 50 ppm.
 - Confirm adequate hood performance before use:
 - Keep hood lowered to the required level at all times, except when adjustments within the hood are being made
 - Keep materials stored in hoods to a minimum
 - Do not allow materials to block vents or air flow.
 - Leave the hood in the *ON* position if toxic substances are present within, or if it is uncertain whether adequate general laboratory ventilation is sufficient when the hood is in the *OFF* position.
18. Keep all oxidizing agents stored separately from solvents.

III. CRITERIA FOR SAFETY MEASURES

- A. Avoid unnecessary exposure to chemicals.
- B. All chemicals should be stored in closed containers.
- C. Keep all flammable solvents stored separate from acids; ensure each is stored in authorized, appropriate storage cabinets; only remove amount needed for specific experiment; and immediately return large storage container back to the appropriate storage cabinet.
- D. If questionable hazardous conditions are found, immediately notify the Dean/Associate Dean/Director or the EH&S Manager before attempting to remedy the problem.
- E. Properly label all chemicals being disposed of, providing detailed listing of all agents within the containers. *Do not mix questionable agents.*
- F. Maintain a currently updated Safety Data Sheet (SDS) manual within each laboratory area. Review the appropriate SDSs in regard to any questions regarding how to safely handle, store, or dispose of chemicals.
- G. Be aware of unsafe conditions and report to the Dean/Associate Dean/Director when detected.

IV. CHEMICAL INVENTORY

- A. Chemical inventory should be maintained on an annual basis, and a copy of the inventory provided to the EH&S Manager by December 1 of each year.
- B. The chemical inventory lists all the hazardous chemicals in the laboratory. Chemicals listed are those:
 - 1. Classified as hazardous by the Department of Transportation (DOT)
 - 2. Classified as hazardous by Environmental Protection Agency (EPA)
 - 3. Displaying a 2 or greater number in any section of the National Fire Protection Association (NFPA) diamond
- C. Use the Angelina College Chemical Inventory Spreadsheet to list chemicals according to the criteria listed above. The AC Chemical Inventory Spreadsheet is standardized so the various inventories from across the AC Campus can be compiled for Tier 2 reporting purposes.

V. SAFETY DATA SHEETS (SDS)

- A. Upon completion of the chemical inventory, research the manufacturer's website for Safety Data Sheets.
- B. Individualized SDS manuals will be provided to each designated laboratory, with the master SDS library maintained by the Dean/Associate Dean/Directors Office.
 - 1. SDS manuals are kept in a 3-ring binder.
 - 2. A current chemical inventory listing is placed in the front of each manual.

VI. CHEMICAL STORAGE

- A. Types of chemicals must be separated into the appropriate categories. Special attention must be paid to ensure oxidizing and other reactive chemicals are not stored close to interactive agents.
- B. Chemicals must be segregated into appropriate categories. (for example, acids are segregated from bases; and oxidizers are segregated from reducers.)
- C. Chemical storage is kept as small as practical.
- D. Storage on bench tops and in hoods may cause potential exposure to fire and spills.
- E. Cabinets and specially labeled refrigerators are used for chemical storage only. No food is permitted in the refrigerators.
- F. Closed containers are used for transporting flammable liquids within a building.
- G. Cylinders of compressed gases are strapped or chained to a wall or bench top; when not connected to a regulator, compressed gas cylinders are to be capped.

VII. SHIPPING CHEMICALS

- A. Hazardous chemicals will not be shipped or transported from the workplace by Angelina College personnel. The only exception is when hazardous waste or legacy chemicals are picked up by a licensed Transport, Storage and Disposal Company. Any waste chemicals will be labeled, tagged, and packaged according to the Department of Transportation (DOT) rules and regulations.

VIII. LABELS ON IN-HOUSE CHEMICALS

- A. Each hazardous chemical transferred outside the laboratory that is not in its original container must also be labeled.

IX. CONTAMINATED WASTE REMOVAL/DISPOSAL

- A. The Hazardous Waste Plan and Procedures provides the basis for eliminating/minimizing harm to people, other organisms, and the environment that results from the disposal of waste laboratory chemicals. It specifies how waste is to be collected, segregated, stored, and transported. For a copy of this plan contact the EH&S Manager. (ext. 3244)
- B. All collection, segregations, storage, disposal, and transportation of chemicals are performed in accordance with the Hazardous Waste Plan and Procedures.

X. RECORD KEEPING

- A. Incident reports are written and retained by each Dean/Associate Dean/Directors Office, with a copy sent to Human Resources.
- B. Each Dean/Associate Dean/Directors Office maintains medical consultation records, with a copy sent to Human Resources.
- C. Training attendance records are maintained by each Dean/Associate Dean/Directors Office, with an annual report provided to the EH&S Manager.

XI. PERSONAL PROTECTIVE EQUIPMENT (PPE)

- A. Students, Faculty, and Staff are required to wear PPE appropriate to the task(s) at hand.
- B. Protective gloves are required when there is a potential for direct skin contact with hazardous chemicals.
- C. An impervious apron is required when there is a potential for a chemical splash.
- D. Eye protection is required when there is a potential for splashes or sprays of hazardous chemicals.

XII. CHEMICAL HYGIENE TRAINING

- A. All students and staff are trained in chemical hygiene (see Section XIII below) at the time of initial assignment to a work area where hazardous chemicals are present. Training is completed prior to the student or staff member being assigned a task for which he/she has a potential for exposure.
- B. All training is documented in writing by attendance records or signature sheets.
- C. Refresher information and retraining sessions are held periodically—but no less than annually.
- D. Student and Staff training is conducted by a technically qualified individual (TQI). In most cases, this is anticipated to be the lab instructor.

XIII. CHEMICAL HYGIENE TRAINING OBJECTIVES

- A. Upon completion of the chemical hygiene training, the student or employee will be able to:
 - 1. Locate the potentially hazardous chemicals in the specific work area.
 - 2. Recognize the chemical labeling and its meaning.
 - 3. Locate the SDS book in the specific work area.
 - 4. Locate the health hazard, physical hazard, environmental protection, and special protection sections of the SDS and explain their use.
 - 5. Identify the appropriate protective clothing for the area.

XIV. CHEMICALS REQUIRING APPROVAL FOR USE

- A. There are certain chemicals used in the chemistry lab that due to their particular hazardous nature require an evaluation of the proposed protective procedures before any activity involving handling of the chemical is commenced.
- B. Approval from the Dean/Associate Dean/Director is required before ordering or working with any of the acutely hazardous chemicals (ACH) appearing on the attached list.

XV. ACUTELY HAZARDOUS CHEMICALS (PARTIAL LIST)

- A. The listing should be reviewed as necessary to keep it up-to-date.
- B. The following list provides an idea of the types of materials that should be considered as acutely hazardous, and hence requiring approval before purchasing or use.

1. Toxic Gas

- Carbon Monoxide
- Arsine
- Fluorine
- Hydrogen cyanide
- Phosphine

2. Acutely Toxic Compounds

- Dioxin
- Ricin
- Plutonium
- Cyanide Compounds

3. Shock Sensitive Compounds

- Picramide
- Chloride
- Picric acid
- Various nitro compounds (e.g., nitroglycerin)
- Benzoyl peroxide
- Acetyl peroxide

4. Highly Corrosive Compounds

- Benzenesulfonic acid
- Hydrofluoric acid
- Methanoic acid
- Ethanoyl chloride
- Benzotrichloride

5. Extremely Flammable Compounds

- Carbonyl sulphide
- Carbon monoxide
- Ethylene oxide
- Arsine
- Di-n-propylamine

XVI. MEDICAL CONSULTATIONS AND EXAMINATIONS

- A. For any situation requiring emergency medical attention, dial 911.

XVII. CHEMICAL HYGIENE PLAN RESPONSIBILITIES

- A. The chemical hygiene responsibility for a specific laboratory rests with the laboratory instructor and receives backing from the Dean/Associate Dean/Director. The laboratory instructor must:
1. Monitor procurement, use, and disposal of chemicals used in the lab.
 2. Know the legal requirements concerning regulated substances in use. (*Regulated* refers to the EPA "List-of-lists")
 3. Seek ways to improve the chemical hygiene program.
 4. Ensure students know and follow the chemical hygiene rules, which protective equipment is available and in working order.
 5. Determine the required levels of protective apparel and equipment.
 6. Ensure that facilities and training for use of any material being ordered are adequate.
 7. Planning and conducting each operation in accordance with the chemical hygiene plan.

XVIII. PROVISIONS FOR ADDITIONAL EMPLOYEE PROTECTION

1. Dispose of glass and sharp objects in authorized safety disposal containers.
2. Dispose of all contaminated medical or bio-hazardous waste in authorized biohazard bags.
3. Non-contaminated waste is to be disposed of in regular trash, NOT IN BIO-BAGS. Placing routine items in biological bags cost the college needlessly.
4. Corridors are to remain unobstructed at all times. All carts or other mandatory objects placed within authorized hallways should be placed on the same side of the halls and allow smooth flow of traffic in and out of the laboratory area.
5. Never obstruct exits, fire extinguishers, fire hoses, gas valves, etc.
6. Make sure all equipment is properly grounded and that the wiring of all equipment is in good condition.
 - a) If exposure of the wiring is noticed, immediately unplug the equipment and notify your immediate supervisor and Dean/Associate Dean/Director.
7. In any case of exhaust failure,
 - a) If personnel are in danger of contamination by toxic or infectious agents, immediately remove all personnel from the area, closing off the area until the problem has been properly resolved.
 - b) Immediately notify your immediate supervisor and Dean/Associate Dean/Director.
8. Chemical Storage Cabinets are to be placed away from laboratory exits.

XIX. GLOSSARY

A. The following terms are used as part of the Chemical Hygiene Plan:

- ACUTE – An adverse effect with symptoms of high severity coming quickly to a crisis.
- CARCINOGEN - A substance capable of causing cancer.
- CHEMICAL AGENTS – A wide variety of fluids that have a high potential for body entry by various means. Some are more toxic than others and require special measures of control for safety and environmental reasons.
- CHP – Chemical Hygiene Plan
- CHRONIC – An adverse effect with symptoms that develop slowly over a long period of time or that frequently recur.
- COMBUSTIBLE – Able to catch on fire and burn
- DOT – Department of Transportation
- EPA – Environmental Protection Agency
- FLAMMABLE – Capable of being easily ignited and of burning with extreme rapidity.
- INFECTIOUS AGENTS – Sources that cause infectious either by inhalation, ingestion, or direct contact with the host materials.
- LABORATORY SCALE – Work with chemicals that can be easily and safely manipulated by one person excluding the commercial production of chemicals for sale.
- LC 50 – The concentration of a substance in air that causes death in 50% of the animal exposed by inhalation. A measure of acute toxicity.
- LD 50 – The dose that causes death in 50% of the animals by swallowing a substance. A measure of acute toxicity.
- SDS – Safety Data Sheet
- MUTAGEN – Capable of changing cells in such a way that future cell generations are affected. Mutagenic substances are usually considered suspect carcinogens.
- NFPA – National Fire Protection Agency
- OSHA – Occupational Safety and Health Administration, the regulatory branch of the Department of Labor concerned with employee safety and health.
- PEL – Permissible Exposure Limit. This is the legally allowed concentration in the workplace that is considered a safe level of exposure for an 8-hour shift, 40 hours per week.
- PPE – Personal Protective Equipment
- pH – A measure of how acidic or caustic a substance is on a scale of 0 to 14. A pH of 0 indicates that a substance is acetic; and a pH of 14 indicates that a substance is basic.
- PHYSICAL AGENTS – Workplace sources recognized for their potential effects on the body. Heat exposure or excessive noise levels are examples of this risk group.
- SDS – Safety Data Sheet
- SENSITIZERS – Agents to repeated exposure over time creating an allergic reaction at some point in time.
- STERILITY – Changes made in male or female reproductive systems resulting in inability to reproduce.

- TERATOGENS – A substance that causes a deformity in newborns if a significant exposure exists during pregnancy.
- TLV – Threshold Limit Value. The amount of exposure allowable for an employee in an 8-hour day.
- TQI – Technically Qualified Individual

XX. REFERENCES

1. National Research Council. *Prudent Practices for Handling of Chemicals from Laboratories*, National Academy Press, 1981.
2. National Research Council. *Prudent Practices for Disposal of Chemicals from Laboratories*, National Academy Press, 1983.
3. *A Model Chemical Hygiene Plan for Laboratories*, Terry Jo Gile, MT (ASCP), MAED Clinical Laboratory Management Association, Inc. 1990.